WHITESTONE
solar farm

WHITESTONE SOLAR FARM

Volume 6: Environmental Statement

6.5 Chapter 5: The Proposed Development

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Glossary

Term	Meaning
Cable Corridors	Corridors within which the high voltage cables would be constructed.
Environmental Statement (ES)	The Environmental Statement which presents the environmental information relating to the Proposed Development. The ES has been prepared to present information for formal consultation in accordance with current EIA regulation.
Long Lane 400kV Substation	The new 400 kilovolt substation proposed on land immediately east of Long Lane, Brinsworth, S60 4JJ.
National Grid Brinsworth Substation	The existing 275 kilovolt substation at Brinsworth, located on Howarth Lane, Brinsworth, S60 5LW.

Term	Meaning
Order Limits	Maximum extent of the Proposed Development comprising the Site and Cable Corridors.
Point of Connection	The new National Grid substation at Long Lane (Long Lane 400kV Substation) where the Proposed Development would connect to the National Grid.
Solar PV infrastructure	Solar PV arrays and supporting infrastructure.
The Applicant	Whitestone Net Zero Ltd.
The Application	The Application submitted to the Secretary of State for a Development Consent Order.
The Proposed Development	The proposed Whitestone Solar Farm.
The Site	The land planned to be used for solar PV array and associated infrastructure, BESS, substation, landscaping and habitat enhancement. The Site is split into W1, W2, and W3
Whitestone 1 (W1)	The northern parcels of the Whitestone Solar Farm.
Whitestone 2 (W2)	The middle parcels of the Whitestone Solar Farm.
Whitestone 3 (W3)	The southern parcels of the Whitestone Solar Farm.

Acronyms

Acronym	Meaning
AGL	Above Ground Level
AIL	Abnormal Indivisible Load
BESS	Battery Energy Storage System
BGL	Below Ground Level
BNG	Biodiversity Net Gain
CCTV	Closed-Circuit Television Systems
CEMP	Construction Environmental Management Plan
CTM	Conventional Tunnelling Method
DC	Direct Current
DCO	Development Consent Order
DEFRA	Department for Environment, Food, and Rural Affairs
DEMP	Decommissioning Environmental Management Plan
EIA	Environmental Impact Assessment
ERM	Environmental Resources Management
ES	Environmental Statement
HDD	Horizontal Directional Drilling
LPA	Local Planning Authority
MV	Medium Voltage

Acronym	Meaning
NGR	National Grid Reference
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
oBSMP	Outline Battery Safety Management Plan
oCEMP	Outline Construction Environmental Management Plan
oCTMP	Outline Construction Traffic Management Plan
oDEMP	Outline Decommissioning Environmental Management Plan
oLEMP	Outline Landscape and Ecology Management Plan
oPRoWMP	Outline Public Rights of Way Management Plan
PCS	Power Conversion Stations
PIR	Passive Infrared
POC	Point of Connection
PRoWs	Public Rights of Way
PRoWMP	Public Rights of Way Management Plan
PV	Photovoltaic
RMBC	Rotherham Metropolitan Borough Council
TBM	Tunnel Boring Machine
W1	Whitestone 1
W2	Whitestone 2
W3	Whitestone 3

Units

Units	Meaning
dB	Decibel
kV	Kilovolt
m	Metres
mm	Millimetres
MW	Megawatts

5 THE PROPOSED DEVELOPMENT

5.1 Introduction

5.1.1 This Chapter of the Environmental Statement (ES) has been prepared by Environmental Resources Management Limited (ERM) on behalf of Whitestone Net Zero Ltd ('the Applicant') to describe the components of Whitestone Solar Farm (hereafter referred to as the 'Proposed Development').

5.1.2 This Chapter provides a description of the Proposed Development. The physical characteristics of the development are described alongside the key activities that will be undertaken during construction, operation and maintenance, and decommissioning. The following description of the Proposed Development informs the technical assessments of **ES Volume 2, Chapters 6 to 17 [EN0110020/APP/6.6-6.17]** of this ES.

The Order Limits

5.1.3 This extent of the Order Limits is shown in **ES Volume 3, Figure 3.1: Order Limits [EN0110020/APP/6.19]** and the Proposed Development described in this Chapter is shown spatially on the **Works Plans [EN0110020/APP/2.3].**

The Proposed Development

5.1.4 The Proposed Development involves the construction, operation and maintenance, and decommissioning of more than 100 megawatt (MW) of solar photovoltaic (PV) arrays, Battery Energy Storage System (BESS), onsite substations and supporting infrastructure, and grid connection infrastructure. The grid connection infrastructure would connect the Proposed Development to the National Grid at the new 400 kilovolt (kV) National Grid substation proposed on land immediately east of Long Lane, Brinsworth, S60 4JJ (Long Lane 400kV Substation), located east of Long Lane, Rotherham. National Grid has applied to Rotherham Metropolitan Borough Council (RMBC) for the development of this new substation which is intended by National Grid to be operational in time for the Proposed Development to connect in 2029. The Long Lane 400kV substation is subject to a separate planning application taken forward by National Grid. The Proposed Development includes a Cable Corridor required to the connection point within the Long Lane 400kV substation. This is described in **ES Volume 1, Chapter 3: The Site and Surrounding Area [EN0110020/APP/6.3]** and shown on the **Works Plans [EN0110020/APP/2.3].**

5.1.5 As the Proposed Development would have a generating capacity in excess of 100MW, it is considered to be a Nationally Significant Infrastructure Project (NSIP) under the Planning Act 2008.

5.1.6 The Proposed Development would be located within the Order Limits. The Order Limits encompass the total area of the Proposed Development comprising the Site and Cable Corridors. The Site is specifically the land that is planned to be used for solar PV array and associated infrastructure, BESS, substation, landscaping and habitat enhancement. The Site is split into Whitestone 1 (W1), Whitestone 2 (W2), and Whitestone 3 (W3) as described in **ES Volume 1, Chapter 3: The Site and Surrounding Area [EN0110020/APP/6.3]**.

5.1.7 Highway Works are sections of the highway network that will contain localised improvements, such as improvements to road edge where it is deteriorated, or temporary highway and traffic works required to safely accommodate the Abnormal Indivisible Load (AIL) deliveries. These areas will support the movement of construction vehicles on narrower sections of the local highway network within parts of the construction vehicle routes to the Site (refer to **ES Volume 2, Chapter 13: Traffic and Transport [EN0110020/APP/6.13]**).

Supporting Documents

5.1.8 This Chapter is supported by the following figures which can be found in **ES Figures [EN0110020/APP/6.19]**:

- **Figure 3.1: Order Limits**;
- **Figure 3.2: Site Referencing**;
- **Figure 3.3: Detailed Site Referencing**;
- **Figure 5.1: Illustrative Masterplan**; and
- **Figure 5.2: Penny Hill Wind Farm Height Restriction Area**.

5.1.9 This Chapter is supported by the following documents submitted as part of the Application:

- **Land Plans [EN0110020/APP/2.2]**;
- **Works Plans [EN0110020/APP/2.3];** and
- **Outline Design Parameters [EN0110020/APP/7.3]**.

5.2 Applying the Rochdale Envelope

5.2.1 Large scale developments often undergo significant design changes during the pre-application stage. Consequently, development design must remain adaptable to economic and technological shifts. The Planning Inspectorate acknowledges the importance of design evolution and flexibility, especially considering how pre-application and Environmental Impact Assessment (EIA) consultations can positively influence the Proposed Development's design[1]. A "Rochdale Envelope" approach is used to accommodate flexibility in design, as described in the Planning Inspectorate's Advice Note Nine[2].

5.2.2 The advice note acknowledges that there may be aspects of the Proposed Development's design that are not yet fixed, and therefore, it may be necessary for the EIA to assess likely worst-case variations to ensure that all foreseeable significant environmental effects of the Proposed Development are considered. For the purpose of the technical assessments in this ES, the worst-case scenario is presented using the maximum potential extent of each component of the Proposed Development, as described in Section 5.4.

5.2.3 Through this approach, an EIA robustly assesses the likely significant effects of the Proposed Development on the environment by taking account of reasonable design flexibility and variations. Such an approach is good practice, as reflected in case law that led to the definition of the 'Rochdale Envelope' principle: *R. v*

Rochdale MBC ex parte Milne (No. 1) and R. v Rochdale MBC ex parte Tew [1999] and R. v Rochdale MBC ex parte Milne (No. 2) [2000]. When suitably applied in EIA it can help to avoid the need for protracted resubmission procedures at a later stage, whilst giving a comprehensive assessment of the likely environmental effects.

5.3 Outline Design Parameters and Good Design

5.3.1 A list of Outline Design Parameters has been developed to represent the maximum spatial extent for each component of the Proposed Development as presented in **Outline Design Parameters [EN0110020/APP/7.3]**. The maximum extent of each component has determined the parameters for the technical assessments in this ES.

5.3.2 National Planning Statement (NPS) Overarching National Policy Statement for Energy (EN-1)[3] sets out the importance of good design. This has been considered from the early stages of the Proposed Development's lifecycle, influencing site selection, suitable use of land, and physical appearance of the Proposed Development. This process is detailed further in **ES Volume 1, Chapter 4: Alternatives and Design Evolution [EN0110020/APP/6.4]**. Design principles were developed at the concept stage of the Proposed Development and have been updated throughout the Proposed Development's lifecycle. The design principles are based on an understanding of the Proposed Development's local context, the people it would affect, and the potential outcomes and benefits it can deliver. The design principles for the Proposed Development are detailed in **ES Volume 1, Chapter 4: Alternatives and Design Evolution [EN0110020/APP/6.4]**. These principles have been considered throughout design development and are continuously tested and improved in response to baseline surveys, design evolution and stakeholder feedback and have informed the **Outline Design Parameters [EN0110020/APP/7.3]**.

5.3.3 Additionally, the design has incorporated a number of standard buffers for the location of infrastructure from easily identifiable features, with the aim of reducing any potential impacts to sensitive receptors where practicable. These buffers, as set out in the **Outline Design Parameters [EN0110020/APP/7.3]**, are:

- 5m from hedgerows;
- 25m from woodland;
- 15m from individual trees;
- 10m from waterbodies, watercourses, and drainage ditches; and
- 15m from Public Rights of Way (PRoWs).

5.3.4 These buffers have been applied to most work areas as described in Section 5.4. Some components of the Proposed Development such as underground cables have not been subjected to all of these buffers, due to nature of impact on these receptors.

5.4 Description of the Proposed Development

Components of the Proposed Development

5.4.1 This section describes each component of the Proposed Development. These have been divided into Works Nos. in line with the **Outline Design Parameters [EN0110020/APP/7.3], Works Plans [EN0110020/APP/2.3]**, and **Draft Development Consent Order (DCO) [EN0110020/APP/3.1]**.

5.4.2 The Order Limits as described in **ES Volume 1, Chapter 3: The Site and Surrounding Area [EN0110020/APP/6.3]** and shown in **ES Volume 3, Figure 3.1: Order Limits [EN0110020/APP/6.19]** would contain the following components:

- Solar PV Infrastructure;
- Interconnection Cables;
- BESS;
- Substations;
- Highway Works;
- Landscaping and Biodiversity Mitigation / Enhancement;
- Drainage Works;
- Temporary Construction Compounds; and
- Other Works (access tracks, security, lighting, and Glint and Glare fencing).

5.4.3 A detailed description of each element of the Proposed Development is set out below, and where appropriate has been divided by site reference. The Site reference is described in **ES Volume 1, Chapter 3: The Site and Surrounding Area [EN0110020/APP/6.3]** and shown in **ES Volume 3, Figure 3.2: Site Referencing** and **ES Volume 3, Figure 3.3 Detailed Site Referencing [EN0110020/APP/6.19].** The descriptions below provide a context for the Environmental Statement, the definition of each of the Works for the Proposed Development can be found in Schedule 1 of the **Draft DCO [EN0110020/APP/3.1]**.

Work No.1 - Solar PV Infrastructure and Secondary Construction Compounds

5.4.4 This section describes the solar PV arrays and supporting infrastructure (solar PV infrastructure) proposed to be developed. These can be seen in **ES Volume 3, Figure 5.1: Illustrative Masterplan [EN0110020/APP/6.20]**.

5.4.5 The extent of solar PV arrays has been determined through ongoing technical assessments and consultation with local communities and consultee groups. Further details of the design evolution process are available in **ES Volume 1, Chapter 4: Alternatives and Design Evolution [EN0110020/APP/6.4]**.

5.4.6 The design process for the solar PV infrastructure has incorporated a number of offsets via the **Outline Design Parameters [EN0110020/APP/7.3]** from features such as drainage ditches, watercourses, water bodies, hedgerows and tree lines. Offsets from PRoWs and residential dwellings have been secured through the **Works Plans [EN0110020/APP/2.3]**.

Solar PV Modules

5.4.7 Solar PV modules are designed to transform sunlight into direct current (DC) electricity. These individual modules, often measuring approximately 2.4m in length and 1.3m in width, are typically composed of a sequence of PV cells protected by a layer of hardened glass. The module frame is typically built from anodised aluminium. The physical size and generating capacity of individual PV modules should not be seen as fixed metrics specified in the Application that constrain the design of the solar development. Rather, the detailed design will be guided by the **Outline Design Parameters [EN0110020/APP/7.3]** and the maximum total area of solar PV array will be as shown in the **Works Plans [EN0110020/APP/2.3]** which has been considered as a worst-case scenario in this ES for identifying potential environmental effects.

5.4.8 Infrastructure in Works No. 1 would not be located within the standard buffers presented in Section 5.3. Additionally, no Works No. 1 infrastructure would be located within the Root Protection Area of veteran trees. A 5.3m minimum clearance would be maintained between the highest point of the PV modules to National Grid 400kV and 275kV overhead lines, accounting for both still and conductor swing.

5.4.9 Additionally, some flexibility will likely be required to adapt to future technological advancements. **Image 1: Typical Example of a Solar PV Array** shows a typical solar PV array similar to the Proposed Development. It should be noted that **Image 1: Typical Example of a Solar PV Array** is an indicative representation of a similar development, and the Proposed Development may not look exactly alike.

Image 1: Typical Example a of Solar PV Array

5.4.10 The Proposed Development would comprise south-facing, fixed solar PV modules at an angle of between 8 and 25 degrees. The solar PV arrays would vary in height, the minimum height of the lowest part of the solar PV modules would be 0.4m above ground level (AGL). The proposed maximum height of the top of the solar PV modules would be 3.8m AGL. The only exception to this would be in the Penny Hill Wind Farm restriction area (see **ES Volume 3, Figure 5.2: Penny Hill Wind Farm Height Restriction Area [EN0110020/APP/6.19]**), where the height would not exceed 3m.

5.4.11 Solar PV modules would be bifacial, meaning both faces of the modules would have the capacity to absorb sunlight. Solar PV modules would be black, blue, or dark grey in colour with an anti-reflective coating. The solar PV modules would be installed in rows, with a minimum of 3.5m between each row.

5.4.12 It is anticipated that the water needed for cleaning panels during the Operation and Maintenance Phase would be delivered to the Site by trucks. Further details are provided in the **outline Operation Environmental Management Plan [EN0110020/APP/5.10]**.

Solar Mounting Infrastructure and Perimeter Fencing

5.4.13 The solar PV modules would be mounted on solar PV frames. These solar PV frames would be galvanised or bare metal and would be pile driven or installed by helical screws to a maximum depth of 4m below ground level (BGL). Where ground investigation surveys show the ground to be unsuitable, for piles or screws or in areas of high archaeological sensitivity, a concrete ballast or appropriate alternative may be used.

5.4.14 Perimeter fencing around the solar PV array would comprise wooden post and wire fencing, an example of which can be seen in **Image 1: Typical Example of a Solar PV Array**, or wooden post and galvanised welded wire. Fencing surrounding the solar PV array is anticipated to be a maximum of 2.2m in height. If necessary, a double fence may be installed. Mammal gates would be incorporated into perimeter fencing to allow for movement of wildlife, an example of which can be seen in **Image 2: Example of a Mammal Gate in Perimeter Fencing**.

Image 2: Example of a Mammal Gate in Perimeter Fencing

5.4.15 All DC cable connecting strings of modules will either be secured to the solar PV frames or buried underground to a maximum, depth of 1.2m BGL. Trenches for burying these cables would typically be 0.3m to 1.5m in width. String combiner boxes would be distributed if and as required, most likely fixed to the end of solar rows.

Inverters

5.4.16 Inverters convert DC electricity from the solar PV modules to AC, allowing export onto the grid system. Inverters can range from the smallest "string inverters" through "mini-centrals" to "central" inverters. There is significant size variation both between and within those categories, which determines the physical size of the units and how many PV modules each unit serves.

5.4.17 The most appropriate type of inverter will depend on technical and environmental aspects which will inform the detailed design. Larger inverters would be included in the PCSs, smaller units could be installed as standalone. If inverters were installed outside of the PCS, they would not exceed the parameters outlined in **Table 5.1**.

Power Conversion Stations

5.4.18 Power conversion stations (PCS) comprise inverters, transformers, and switchgear. These components serve multiple purposes to manage the output generated by the solar PV modules, which are described below.

5.4.19 Where practicable, PCS enclosures will not be located within 100m of residential dwellings and 50m of public rights of way. PCS enclosures would be located outside of Flood Zones 2 and 3. In all cases PCS units will be designed to ensure a night time noise rating level at residential receptors of no greater than 5dB(A) above baseline conditions in line with guiding principles set out in BS 4142[4].

5.4.20 The components of the PCS would be housed together in a single enclosure and would be a muted colour which would be sensitive to the surrounding environment. These enclosures would be a maximum of 13m long by 3m wide with a maximum height of 3.5m, excluding foundations and noise mitigation requirements to be installed as required. As with the solar PV array, in the Penny Hill Wind Farm restriction area, the height of that PCS would not exceed 3m (see **ES Volume 3, Figure 5.2: Penny Hill Wind Farm Height Restriction Area [EN0110020/APP/6.19]**).

5.4.21 The PCSs would be placed on a hardstanding foundation which would not typically exceed depths of 2m BGL but could also include piling to depths of up to 5m BGL.

5.4.22 The PCS enclosures would be surrounded by a galvanised welded wire fence which would not exceed 3.5m AGL. **Image 3: Example of a PCS** shows an example of a PCS similar to those expected as part of the Proposed Development. It is worth nothing that PCS enclosures can greatly vary in size, and the example shown represents a worst case unit size.

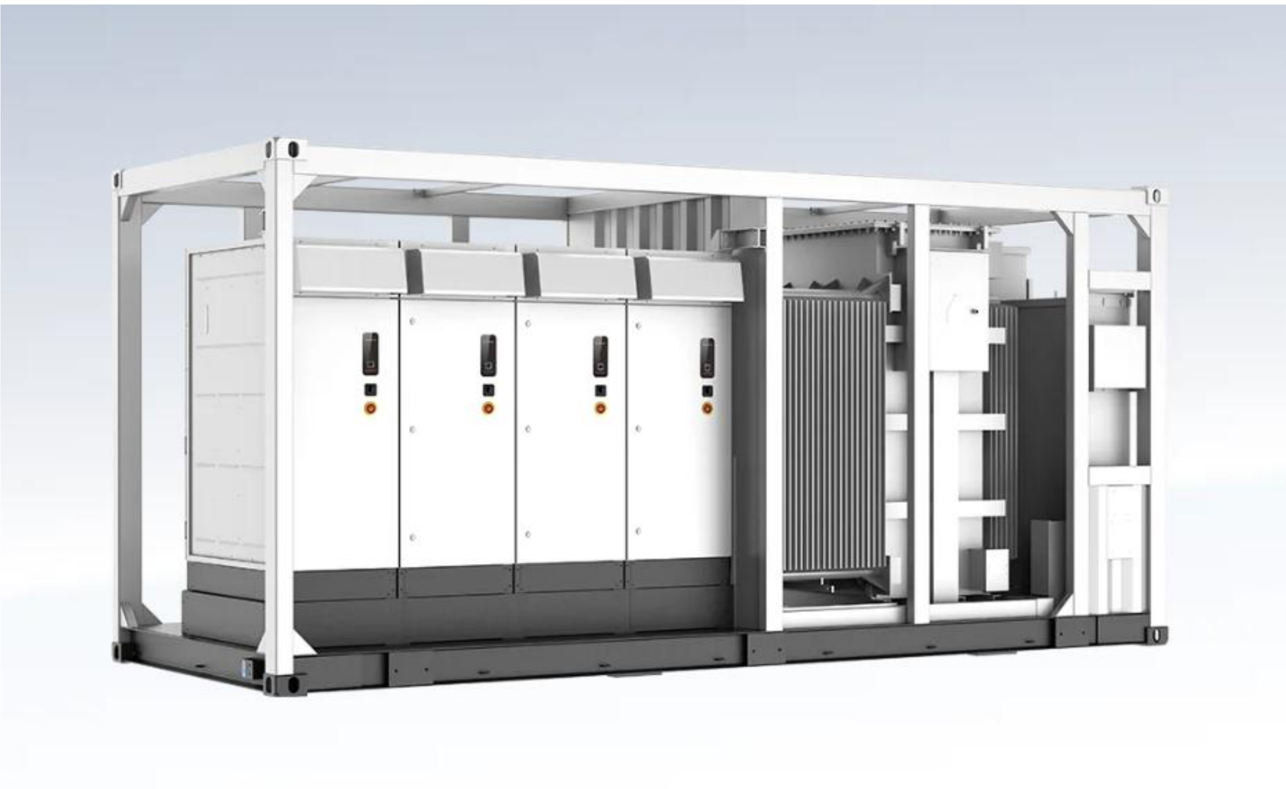

Image 3: Example of a PCS

Switchgear

5.4.23 Switchgear, which includes electrical disconnect switches, fuses, or circuit breakers, is used to control, protect, and isolate electrical equipment. It serves both to de-energise equipment for maintenance and to clear downstream faults. Typically, switchgear is located within or adjacent to the transformer housing.

Transformers

5.4.24 Transformers increase the voltage of the electricity generated by the Solar PV infrastructure for distribution to the on-site substation and further to connect to the National Grid Long Lane 400kV Substation.

Secondary Construction Compounds

5.4.25 To support the primary construction compounds, secondary construction compounds areas would be required for the temporary storage of infrastructure before it is installed as part of the Proposed Development. Secondary construction compounds would be located outside of the standard buffers presented in Section 5.3.

5.4.26 Secondary construction compounds would measure a maximum of 100m by 100m.

5.4.27 **Table 5.1** provides a basis for assessment of Work No. 1.

Table 5.1: Outline Design Parameters for Work No.1

Solar PV Modules	Outline Design Parameters
Module Colour	Solar PV modules would be black, blue, or dark grey in colour with an anti-reflective coating
Bifacial / Monofacial	Solar PV modules would be bifacial
Maximum height of highest elements of solar PV modules	3.8m AGL
Minimum height of lowest elements of solar PV modules	0.4m AGL
Indicative tilt of solar PV modules	Modules would be sloping south at a fixed angle of 8 to 25 degrees from the horizontal
Minimum distance between rows of solar PV modules	3.5m
Cabling	All DC cables will be secured to the solar PV frames or buried underground up to a depth of 1.2m deep in a trench typically measuring 0.3m to 1.5m in width.
Solar PV Mounting	
Frame material	Galvanised metal or bare metal
Frame installation	Pile driven, helical screws or equivalent. Concrete ballast or appropriate alternatives to be used where required by outcomes of

Solar PV Modules	Outline Design Parameters
	ground investigation and in areas of high archaeological sensitivity.
Maximum depth of frame installation	4m BGL
Perimeter Fencing	
Fencing materials	Wooden post and wire fencing or wooden post and galvanised welded wire.
Design	Maximum height of 2.2m AGL. Double fencing may be installed if required. Mammal gates would be incorporated
PCS	
Locations of PCS	Where practicable, PCS enclosures will not be located within 100m of residential dwellings and 50m of public rights of way. In all cases PCS units will be designed to ensure a night time noise rating level at residential receptors of no greater than 5dB(A) above baseline conditions.
Maximum dimensions of PCS enclosures	13m long, by 3m wide, by 3.5m high, other than within Penny Hill restriction area in which they would not exceed 3m high.
Maximum depth of PCS foundations	Up to 2m BGL or up to 5m BGL where piled foundations are required
Colour of PCS enclosures	Muted and sensitive with surroundings
Fencing	Colour-sensitive palisade fencing, with a maximum height of 3.5m AGL.
Secondary Construction Compounds	
Scale	Secondary construction compounds would measure up to 100m by 100m

Work No. 2 – Interconnection Cables

5.4.28 The point of connection (POC) for the Proposed Development into the National Grid would be via the Long Lane 400kV Substation, located to the east of Long Lane, Rotherham at approximately National Grid Reference (NGR) SK444895. It should be noted that Long Lane 400kV Substation is not part of the Proposed Development and is being taken forward by National Grid in a separate planning application submitted to RMBC. To ensure the Proposed Development can connect into the National Grid, the location of Long Lane 400kV Substation has been included in the Order Limits.

5.4.29 W1, W2, and W3 would be interconnected and connected to the grid by high voltage underground cables. The voltage of these cables is not yet confirmed but would be up to 400kV. At this stage, the exact route of these underground cables is unknown, corridors have therefore been identified within which the cables would run. These corridors serve as boundaries for further investigations, which will inform the ultimate routing of the cables. The Cable Corridors detailed in this ES are therefore wider than would be required for the laying of the cables. Some routes have options (D1/D2, G1/G2, I1/I2, and K1/K2) which are being considered in the Proposed Development, and a worst case is assessed in this ES. A description of the Cable Corridors is given in **ES Volume 1, Chapter 3: The Site and Surrounding Area [EN0110020/APP/6.3]**.

5.4.30 Due to the different voltages and operational requirements for each route that would be installed, the expected construction corridor widths differ for each Cable Corridor. The anticipated maximum construction corridor width and easements are displayed in **Table 5.2**.

5.4.31 It is noted however that the entire maximum construction width would not be trenched. Soil removal would be limited only to necessary areas, and reinstated following construction as secured in the outline Soil Management Plan which forms part of the **outline Construction Environmental Management Plan (oCEMP) [EN0110020/APP/5.9]**, which are secured in the requirements of the **Draft DCO [EN0110020/APP/3.1]**. The maximum construction width is needed to accommodate all components of construction, including access roads, storing of soil deposits, and locations for vehicle movements. It is therefore anticipated that a 40m corridor would be required to accommodate these activities.

5.4.32 For the purposes of this ES, assessments have assessed the maximum construction width as the maximum width needed to accommodate all construction activities required for cable installation as a reasonable worst-case scenario. In addition to the below widths, there would be a requirement in some locations for an access track to intercept the construction corridor. Additionally, temporary construction compounds are expected to be required. These are to be located within the Cable Corridor construction area wherever possible, but in certain locations, may be located adjacent (but within the Order Limits) based on detailed design.

Table 5.2: Anticipated maximum construction widths and easements

Cable Route	Anticipated Maximum Construction Width	Anticipated Maximum Easement
Cable Route A and B	40m	10m
Cable Route C	40m	10m
Cable Route D1 / D2 / G1 / G2	40m	10m
Cable Route F	40m	10m
Cable Route H / I1 / I2	40m or 120m depending on cable voltage	10m
Cable Route J / K1 / K2	40m	10m
Cable Route L	40m	10m
Cable Route M / N	40m	10m

5.4.33 All high voltage cabling to be installed as part of the Proposed Development would be laid below ground according to British Standards and regulations. The construction method for installation of the cable would typically be open cut trench and trenchless methods in required locations.

5.4.34 In the first instance, the open cut trench method would be used, however, the use of any trenchless method would be dependent on the type of crossing. When open cut trenching is not possible, a trenchless method would be used to minimise the disruption and impact on various crossing points, such as roads, railways, paths, existing infrastructure and environmentally protected areas.

5.4.35 The open cut trenching method can install cables via direct burying or ducting.

5.4.36 The direct buried method typically requires longer sections (up to 500m) of trenching to be exposed at a time to allow for the cable to be rolled/laid into the trench before backfilling.

5.4.37 Ducting of cables utilises shorter sections of exposed trenching at a time where the ducts are typically installed and backfilled in 20 to 40m sections, which is substantially shorter than the sections required for direct burying. Following this, the cables are installed by being pulled through the ducts. It is anticipated that ducting would be the preferred method for the Proposed Development due to shorter sections of trench being exposed at a time.

5.4.38 For the open cut trench sections of the grid connection route, a typical working width corridor of 40m is anticipated. This area would include the open cut trench for laying of the medium or high voltage cables (direct burying or ducting), temporary haul road (for vehicles, plant and access to joint bays), temporary drainage ditch and a laydown area for the storage of topsoil following excavation of the cable trench.

5.4.39 The temporary haul road would be a maximum of 5m wide for typical straight sections and temporary track matting would be used where required. Turning bays and passing places would be provided in appropriate locations and exceed 5m in width. Drainage requirements cut/fill to create a safe road may at time extend the road extents past 5m, but this is expected to be minimal.

5.4.40 Topsoil and subsoil would be stored in separate bunds to avoid mixing. Guidance on indicative stripping depths states 300mm for topsoil and 700mm for subsoil removal. However, soil horizons should be stripped on-site according to their individual compositions. The building and storage of soil storage bunds should follow the guidance provided in Sheets B and C of The Institute of Quarrying Good Practice Guide for Handling Soils in Mineral Workings.

5.4.41 There are different viable trenchless methods that can be used for the cable installation. The selection of a trenchless method would be dependent on the type of crossing, alignment, required length of crossing, ground conditions and depth. The method would be appropriately selected on a crossing-by-crossing basis and would likely be one of the following:

- Horizontal Directional Drilling (HDD); or
- Tunnel Boring Machine (TBM) Tunnelling: (Microtunnelling/Pipe Jacking; and/or Conventional Tunnelling Method (CTM)).

5.4.42 Locations of trenchless crossings include:

- Crossing major permanent watercourses (such as Chesterfield Canal);
- Crossing major roads such as the M1 and M18 and A roads; and
- Crossing railways (such as the Sheffield to Lincoln Line and Manchester to Cleethorpes Line).

5.4.43 In addition, at the Cable Corridor access locations, there would be temporary construction lay-down areas which are typically up to 50m x 50m that would be used to support the cable installations. The laydown area footprint would take into consideration topography, drainage, and any heritage and environmental constraints

5.4.44 The laydown areas would allow construction vehicles to turn off public roads and park safely. Activities at the laydown areas would include receipt of deliveries, unloading, provision of welfare, and storage of plant and construction materials. The areas would likely include portacabins, welfare and power generators, and would be secured using Heras fencing and security cameras. In the construction phase, parking would be available at these locations for the workforce. Upon completion of construction, the secondary laydown areas would be removed and the land reinstated as outlined in the **oCEMP [EN0110020/APP/5.9]**.

5.4.45 Where feasible, the higher voltage cables would share trenches with the lower voltage cables along the same routes across the Proposed Development.

5.4.46 All cables would be installed to a maximum depth of 3m BGL where installed via open trench, except for locations of special constraints (e.g. where interacting with an existing utility). The depth of installation will vary where crossing existing utility infrastructure or where trenchless crossings are used. The trench associated with the cables would measure a maximum of 10m wide, with excavations for joint bays extending up to 20m in width.

5.4.47 Trenchless crossing methods would be used where other methods are not possible for the installation of cables crossing watercourses. Cables installed using trenchless methods would be installed at least 1.5m below the bed of each watercourse and avoiding disturbance within 10m of the bank top.

5.4.48 The basis for assessment of the works proposed for Cable Corridors are summarised in **Table 5.3**.

Table 5.3: Outline Design Parameters for Work No. 2

Cable Corridor	Outline Design Parameters
Temporary construction compounds	Temporary construction compounds required for installation of the cable measuring 50m x 50m, may be located within Work No. 2-A – 2-N.
Access tracks	Access tracks will measure between 3.5m – 6m wide and comprise crushed hard core. The first 50m of access track joining the public highway will comprise a tarmac (or similar) surface.
Depth	Interconnection cables would be installed to a maximum of 3m BGL. Depth will vary where crossing existing utilities or watercourses.
Trench width	Trenches would be a maximum of 10m in width, with excavations for joint bays extending up to 20m wide
Crossings	Cables crossing watercourses would be installed at least 1.5m below the bed of the watercourse and avoid disturbance within 10m of the bank top.

Work No. 3 - Battery Energy Storage System

5.4.49 The Proposed Development would incorporate a related BESS, designed to offer peak power generation and grid balancing services to the electrical grid. Its primary is to store excess electricity generated by the solar PV modules and release it when there is demand. The BESS could also draw additional energy from the electricity grid at times of low demand, and store it until times of high demand, to provide grid balancing services and support the minimisation of energy waste, which would assist in provision of a continuous power supply even during periods of low solar activity in the broader grid.

5.4.50 The storage components can be placed on open skids or housed together in enclosed containers (see **Image 4: Example of a BESS Unit** and **Table 5.4**). The exact count of individual battery storage enclosures would depend on the power capacity level and energy storage duration that the Proposed Development requires, and on the output capacity available per unit at the time of procurement.

5.4.51 The BESS would be located adjacent to the Primary Substation, which is described in paragraph 5.4.66, and outside of the buffers of key receptors listed in Section 5.3.The BESS is to be located in W2, as shown in the **Works Plans [EN0110020/APP/2.3].**

5.4.52 The battery storage units within the BESS would be housed on skids or in many cases in containers, an example of which can be seen in **Image 4: Example of a BESS Unit**. The precise housing method and dimensions will be determined as part of the detailed design and supplier selection process post DCO consent. The exact dimensions are yet to be determined but will depend on the capacity of the technology to be used. The maximum dimensions of these containers would be 13m long by 5m wide by 3.5m high AGL. BESS units would be a muted colour, sensitive to the surrounding environment.

Image 4: Example of a BESS Unit

5.4.53 Each battery container would require a cooling system. This system could be either air-cooled or liquid-cooled which have a similar external appearance. An air-cooled system would be external to the containerised unit, either mounted on top or attached to the side, and would include a fan powered by auxiliary power. Alternatively, liquid cooling may be used. The worst case has been described assessed across technical chapters.

5.4.54 The BESS units would be located on foundations of hardstanding, which would not typically exceed depths of 2m BGL. Pile foundations could reach up to 15m depth BGL should they be required following ground investigation. The dimensions and quantities will depend on the number, size and weight of the BESS units chosen at detailed design stage.

5.4.55 Ancillary buildings would be included within the BESS compound. The dimensions of ancillary buildings combined would be a maximum of 40m length by 40m width, with a maximum height of 8m AGL for a proportion of the buildings. These buildings would be a muted colour, sensitive to the surrounding environment.

5.4.56 The BESS compound would be surrounded by a double fence of galvanised welded wire which would be a maximum of 3m in height, with an additional 1m of electrified fencing. Fencing would be muted in colour, and sensitive with the surrounding environment.

5.4.57 The BESS will be designed to ensure a night-time noise rating level at residential receptors of no greater than 5dB(A) above baseline conditions in line with guiding principles set out in BS 4142[4]. Should acoustic fencing be required following technical assessment and modelling, this would be a fence / louvre with a maximum height of 4m AGL, painted a muted colour sympathetic to the surrounding environment.

5.4.58 The BESS will be designed in accordance with the latest guidance to minimise risk during operation. As battery technology develops, the detailed design of the BESS will be updated to ensure compliance with the relevant safety standards at the time of construction.

5.4.59 An **outline Battery Safety Management Plan (oBSMP) [EN0110020/APP/5.15]** has been prepared as part of the Application. The **oBSMP [EN0110020/APP/5.15]** provides the outline requirements of the BESS in the event of a fire. It outlines the safety design measures, including details on:

- Suppression and detection methods;
- Thermal management systems;
- Ventilation and deflagration;
- Emergency response and guidance;
- Post-incident recovery;
- Drainage strategy; and
- Fire suppression systems including sources of water for the purpose of firefighting.

5.4.60 The BESS site would have two points of access during operation to ensure access in the event of a fire. Local Fire and Rescue services have been and will continue to be consulted as part of the DCO process, to support BESS safety requirements incorporation, and to assist local services in remaining aware of the safety systems being proposed and can respond to potential incidents effectively.

5.4.61 The Proposed Development would include at minimum two 120,000 litre static water tanks for any unlikely fire event. Tanks may be connected to a network of hydrants for water supply around the BESS site. Further information on fire management is provided in the **oBSMP [EN0110020/APP/5.15].**

5.4.62 All water supply points, and any potential fire hydrant locations would be clearly identified with appropriate signage and shown on the BESS layout plans. The delivery rate of water is anticipated to be a minimum of approximately 1,900 litres/min for 2 hours, subject to discussion with the local Fire Rescue Service.

5.4.63 An impermeable lining will be incorporated into the design of the BESS compound to prevent infiltration of potential contaminants. Contamination impacts are discussed further in **ES Volume 2, Chapter 9: Ground Conditions and Land Quality [EN0110020/APP/6.9]**.

5.4.64 The basis for assessment of the works proposed for proposed BESS are summarised in **Table 5.4**.

Table 5.4: Outline Design Parameters for Work No. 3

BESS	Outline Design Parameters
Maximum dimensions of BESS units	13m long x 5m wide x 3.5m height AGL
Maximum height of ancillary buildings within BESS enclosure	8m AGL excluding foundations
Maximum footprint of ancillary buildings within the BESS enclosure	40m length by 40m width.
Maximum depth of BESS foundations	2m BGL, unless pile foundations are required which could extend up to 15m BGL.
Design of Fencing	A double fence of galvanised welded wire up to 3m above ground level with an additional 1m of electrified fencing.
Noise Design	Night-time noise level at residential receptors will not exceed 5dB(A) above baseline conditions. Should acoustic fencing be required, this would not exceed 4m height AGL.
Colour of BESS infrastructure	BESS units, ancillary buildings and fencing would be muted in colour, sensitive to the surrounding environment.
Water Storage	A minimum of two 120,000L static water tanks would be incorporated into the BESS design to hold water to respond to any fire event.
Run-off control	An impermeable lining will be incorporated to prevent infiltration of contaminants.

Work No. 4 - Substations

Primary Substation

5.4.65 The Proposed Development would include a primary substation that would act as a combiner point for the interconnection cables from the three solar areas, W1 through to W3, into a single set of cables to connect the Proposed Development to the grid connection point described in **ES Volume 1, Chapter 1: Introduction [EN0110020/APP/6.1]**.

5.4.66 The location of the primary substation is shown in the **Works Plans [EN0110020/APP/2.3]** as sub area 4-2A in W2. It would be located outside of the project buffers detailed in paragraph 5.3.3, and at least 300m from residential properties. The primary substation would be designed to ensure a night-time noise level no greater than 5dB(A) above baseline conditions.

5.4.67 The primary substation would have a maximum footprint of 170m by 100m, and a maximum height of 13.5m AGL. The substation would also require lightning rods, which would be constructed to a maximum height of 20m AGL. Ancillary buildings within all substation compounds (primary and satellite) would have a maximum combined footprint of 1,200m^2 and a maximum height of 8m AGL excluding foundations.

5.4.68 An example of a typical substation similar to the proposed primary substation is shown in **Image 5**.

Image 5: Example of a 400kV Substation

5.4.69 Substations, and associated infrastructure within the substation compound would be located on concrete foundations with a maximum depth of 5m BGL, unless pile foundations are required, which could reach up to 15m BGL.

5.4.70 The substation compound would be surrounded by a double fence of galvanised welded wire which would be a maximum of 3m in height, with an additional 1m of electrified fencing. Fencing would be muted in colour, and sensitive with the surrounding environment.

Satellite Substations

5.4.71 In addition to the primary substation, satellite substations would be necessary to combine the current flowing from a given area of the Proposed Development and convert it to a higher voltage before routing it to the primary substation. The satellite substation may also contain buildings for substation control and operation, welfare facilities and storage areas for equipment for the operation and maintenance of the solar infrastructure.

5.4.72 The Proposed Development would require two satellite substations to collect Medium Voltage (MV) cables, one in W1 and one in W2. These are shown on the **Works Plans [EN0110020/APP/2.3]** as sub-area 4-1A and sub-area 4-2B.

5.4.73 The maximum footprint for satellite substation compounds would be 130m by 90m, and the maximum height would be 13.5m AGL. The substations would also require lightning rods, which would be constructed to a maximum height of 20m AGL. Ancillary buildings within all substation compounds (primary and satellite) would have a maximum combined footprint of 1,200m^2 and a maximum height of 8m AGL excluding foundations.

5.4.74 Satellite substation compounds, and associated infrastructure within the substation compound would be located on concrete foundations with a maximum depth of 5m BGL, unless pile foundations are required, which could extend up to 15m BGL.

5.4.75 The substation compound would be surrounded by a double fence of galvanised welded wire which would be a maximum of 3m in height, with an additional 1m of electrified fencing. Fencing would be muted in colour, and sensitive with the surrounding environment.

5.4.76 The basis for assessment of the works proposed for primary and satellite substations are summarised in **Table 5.5**.

Table 5.5: Outline Design Parameters for Work No. 4

Substation Compound Infrastructure	Outline Design Parameters
Maximum Primary Substation footprint	170m by 100m
Maximum Satellite Substation footprint	130m by 90m
Maximum height of primary and satellite substations	13.5m AGL
Maximum combined footprint of ancillary buildings across all substations	1,200m^2
Maximum height of ancillary buildings within substation compounds	8m AGL
Maximum height of lightning rods within substation compounds	20m AGL
Fencing	A double fence of galvanised welded wire up to 3m above ground level with an additional 1m of electrified fencing.
Maximum depth of substation foundations	5m BGL, unless pile foundations are required, which could extend up to 15m BGL

Work No. 5 - Highway Works

5.4.77 The maximum extent of highway works associated with the Proposed Development is shown in Work No. 5 of the **Works Plans [EN0110020/APP/2.3]**. Highways Works refer to the creation of access points, visibility splays, and any localised upgrades to roads required to accommodate the delivery of AILs and other traffic associated with the Proposed Development.

5.4.78 Site access and routing strategies has been discussed in consultation with the Highways Authorities and local authorities, and set out in **ES Volume 2, Chapter 13: Traffic and Transport [EN0110020/APP/6.13]** and the **outline Construction Traffic Management Plan (oCTMP) [EN0110020/APP/5.12]**.

Work No. 6 - Landscaping / Green Infrastructure

5.4.79 Landscaping / Green Infrastructure comprises all landscaping, habitat enhancement, and biodiversity works to be undertaken as part of the Proposed Development. The planting of new vegetation, seeding and the management of existing vegetation would occur within Work No. 6 as shown in the **Works Plans [EN0110020/APP/2.3]**.

5.4.80 Although Biodiversity Net Gain (BNG) is not mandatory for NSIPs, it is expected that BNG requirements will apply to NSIPs from 02 November 2026 onwards. As the Applicant is committed to designing an environmentally sensitive development, the Proposed Development has been developed to incorporate BNG using methodology prescribed in the Department for Environment, Food and Rural Affairs (DEFRA) Statutory Biodiversity Metric. The BNG will be derived from an integrated landscape and biodiversity led strategy which would seek to mitigate any potential effects on landscape and visual impacts whilst also incorporating ecological enhancements and BNG.

5.4.81 The Proposed Development would include management of existing planting, new native planting, hedgerow enhancement, and planting of suitable seed mixes amongst the solar PV arrays. Indigenous planting would also be used to provide natural screening. Further details of these measures and commitments for aftercare are discussed in the **outline Landscape and Ecology Management Plan (oLEMP) [EN0110020/APP/5.13]**.

Work No. 7 - Drainage Associated with Primary Substation

5.4.82 Drainage Works associated with the Primary Substation would be installed within the bounds of Work No. 7 to the north of Upper Whiston, as shown in the **Works Plans [EN0110020/APP/2.3]**.

5.4.83 Drainage would be managed to slow run-off via attenuation, and then discharged at greenfield rates so as to minimise potential impacts on local watercourses. Attenuation measures have been provisionally sized to accommodate a conservative 1 in 200-year event plus a 45% allowance for climate change.

5.4.84 Should a fire occur at the primary substation and BESS location, the fire suppression system would be activated. As the design of the Primary Substation and BESS would comprise an impermeable layer to reduce risk of infiltration of contaminants, fire water runoff would be managed within Work no. 3, 4, and 7.

Drainage measures are further described in the **outline Surface Water Drainage Strategy [EN0110020/APP/5.17]**.

Work No. 8 - Primary Construction Compounds

5.4.85 Primary compounds would be set up for the temporary storing of materials, plant, and equipment during the construction phase, located outside of project buffers in Section 5.3. These compounds would also house staff welfare facilities, parking areas for construction workforce, waste storage, and wheel washing areas. Adequate lighting would be installed to ensure safety and security.

5.4.86 Once construction is nearing completion, these construction compounds would be removed, and the area would be incorporated into solar and associated infrastructure.

5.4.87 Primary construction compounds would have a maximum footprint of 200m by 200m.

5.4.88 The basis for assessment of the works proposed for Work No. 8 are summarised in **Table 5.6**.

Table 5.6: Outline Design Parameters for Work No. 8

Primary Construction Compounds	Outline Design Parameters
Location	Primary compounds would be located outside of project buffers
Footprint	Primary compounds would have a maximum footprint of 200m by 200 m

Work No. 9 –Crossings over non-navigable watercourses

5.4.89 In cases where watercourses or drains would need to be crossed for vehicular and/or pedestrian access, bridges or culverts could be installed, or works undertaken to alter, maintain, repair or replace existing structures. The locations of these are shown in Work No. 9 of the **Works Plans [EN0110020/APP/2.3]**.

5.4.90 Watercourses could be crossed using options including, but not limited to, bridges and culverts (including box culverts). Tracks top over these watercourses would measure up to 6m in width to support access vehicles.

5.4.91 Crossing foundations would extend up to 5m BGL, or up to 15m BGL where piled foundations are required.

5.4.92 The basis for assessment for works proposed for Work No. 9 are shown in **Table 5.7.**

Table 5.7 Outline Design Parameters for Work No. 9

Crossings Over Non-Navigable Watercourses	Outline Design Parameters
Scale	Track top over the watercourse would measure up to 6m
Design	Crossing foundations would extend up to 5m BGL or up to 15m BGL where piled foundations are required

Crossings Over Non-Navigable Watercourses	Outline Design Parameters
Design	Options for crossings include, but are not limited to, bridges and culverts (including box culverts).

Other Works

5.4.93 Other works for the Proposed Development would include on-site access tracks, fencing and closed-circuit television (CCTV), lighting, and glint and glare fencing. Other Works could be located anywhere in the Order Limits, other than Work Nos. 5 and 7 (see **Works Plans [EN0110020/APP/2.3]**).

5.4.94 As a minimum, access would be required into each area (W1-W3). An **oCTMP [EN0110020/APP/5.12]** for each phase of the Proposed Development has been submitted as part of the Application to minimise traffic disruption and impact, and to be secured by the requirement 5 of the **Draft DCO [EN0110020/APP/3.1]**.

5.4.95 Access tracks installed for the operation and maintenance period would measure between 3.5m and 6m wide and would be constructed using crushed hard core. A minimum of the first 50m of the track joining the public highway would comprise a tarmac (or similar) surface. Drainage ditches and / or swales would be installed to drain water from access tracks. Operational access tracks would not be located within 50m of residential properties, however temporary tracks used for construction activities may be required within this buffer.

5.4.96 Daytime and infrared CCTV systems, mounted on poles and facing internally, would be installed around the perimeter of the operational areas of the Site. CCTV cameras would be installed on poles with a maximum height of 4m AGL. The CCTV cameras would have fixed viewing angles and would be positioned to face along the fence. Any landscaping and biodiversity works would be designed to avoid compromising the effectiveness of the CCTV or security fencing.

5.4.97 Lighting is not required within the solar arrays. However, it would be installed in the primary and satellite substation compounds and the BESS location(s) and would be used only as needed for maintenance and security purposes. Lighting would be operated either by passive infrared (PIR) sensors or manually and directed into the compounds, avoiding hedgerows, tree lines, woodland blocks, watercourses, ponds, and other areas to minimise impact on nocturnal or crepuscular fauna and potential sensitive residential receptors where possible.

5.4.98 Glint and glare screening would be installed as part of the Proposed Development to mitigate glare impacts on highways. Screening would not be located within 5m of a highway boundary. Glint and glare mitigation is further discussed in **ES Volume 2, Chapter 16: Other Environmental Topics [EN0110020/APP/6.16]**.

5.4.99 The basis for assessment of the other works are summarised in **Table 5.8**.

Table 5.8: Outline Design Parameters for Other Works

Other Works	Outline Design Parameters
Access Tracks	Access tracks made of crushed hard core would measure 3.5m to 6m in width. At least the first 50m of track joining the public highway would comprise a tarmac (or similar) surface.
Access Tracks	Drainage ditches and/or swales will be installed to drain water from access tracks.

Other Works	Outline Design Parameters
Access Tracks	Operational access tracks will not pass within 50m of residential properties.
CCTV	CCTV would be installed along fence lines to a maximum height of 4m AGL.
CCTV	CCTV would be inward facing and use infrared lighting
Fencing	Fencing would comprise wooden post and either wire or galvanised welded wire up to 2.2m high AGL. A double fence may be installed. Mammal gates would be incorporated
Lighting	No external lighting would be permanently operated
Lighting	Operational lighting would be for BESS and substation areas only, directional, operated manually or via PIR motion-sensitive sensors, oriented internally away from surrounding environment, and fitted with measures to minimise light spillage
Glint and Glare Fencing	Fences installed to mitigate glint and glare impacts will not be located within 5m of a highway boundary

5.5 Construction Phase

5.5.1 The construction phase is expected to span approximately 24 to 36 months. While the exact timeline would depend on various factors, including the submission and determination of the development consent, the current plan is to commence construction in 2027 and conclude by 2029. However, it should be noted that the construction works would be phased across the Order Limits, so it is unlikely for one area to be undergoing construction for a continuous 24 to 36 months. The earliest date of operation would be 2029, in line with the connection date for the Proposed Development.

5.5.2 Construction hours would be between 0700hrs and 1900hrs Monday to Friday, 0700hrs to 1300hrs on Saturdays, and no working on Sundays or bank holidays. Exceptions to this may be required for trenchless crossings or for time sensitive construction activities such as concrete pouring.

5.5.3 Further details of indicative construction activities and their expected duration are set out in **Table 5.9**.

Table 5.9: Indicative Construction Activities and Their Durations

Construction Activity	Expected Duration
Site Establishment including construction of Site access points	3 months
General Deliveries: Import and export of materials from Site.	Ongoing throughout 26 months
Establishment of Site compounds including: • Installation of surfacing for material storage and parking; • Installation of welfare buildings and Site offices; and • Establishment of secondary compounds which would be used to store materials and welfare to limit movement of internal traffic.	4 months
Site Tracks	6 months

Construction Activity	Expected Duration
Installation of geotextiles	14 months
Preparation of substation platform(s)	6 months
Cabling Works	6 months
Pouring of substation concrete	2 months
Substation HV Deliveries	3 months
Internal HV Works & Buildings	3 months
Solar Array Works	16 months
Installation of cabling & cabling sand	16 months
Battery Platform	6 months
Battery Foundations	4 months
Battery Cabling	4 months
Landscaping and habitat enhancement, including fencing	Ongoing throughout 26 months
Commissioning including testing elements following the completion of key construction elements	5 months
Final Connection	1 month
Staff Movements	Ongoing throughout the anticipated 2 year programme

5.5.4 The main construction and decommissioning access points to the solar PV arrays would be off the public road network with connections to the M1 and M18 primarily. Abnormal loads would be required for the transformers for the on-site substations. The **oCTMP [EN0110020/APP/5.12]** includes details of construction traffic logistics.

5.5.5 The submitted **oCEMP [EN0110020/APP/5.9]** outlines the mitigation measures to be implemented during the construction phase, which would then be developed into a Construction Environmental Management Plan (CEMP) before construction begins. The primary objective of the oCEMP is to set out measures compliant with environmental regulations to minimise environmental impacts. Environmental management plans are prescribed relating to:

- Use of land for temporary laydown areas, accommodation, etc;
- Construction traffic (including parking and access requirements) and changes to access and temporary road or footpath closures (if required);
- Control measures to protect and manage retained planting, habitats, land restoration and enhancement;
- Control measures for water management (surface water and groundwater) to prevent pollution;
- Noise and vibration measures to control noise and vibration levels to protect wildlife and communities;
- Utilities diversion;

- Control measures to manage dust generation and emissions from construction activities;
- Soil handling, removal, storage and waste generation;
- Emergency response and contingency plans relating to spills or extreme weather conditions;
- Communication strategies to keep communities and stakeholders informed throughout the construction process; and
- Mechanisms for monitoring and reporting on the above.

5.5.6 The CEMP will be in substantial accordance with the **oCEMP [EN0110020/APP/5.9]** and would be developed by the Principal Contractor. No phase of the Proposed Development would be able to commence unless the CEMP for that phase is approved by the relevant Local Planning Authority (LPA). This plan would specify the procedures that the Principal Contractor must follow and oversee throughout the construction process. The CEMP would require compliance by Construction Contractors of the Proposed Development with existing environmental control, health and safety regulations, and current legislative and best practice guidance.

5.5.7 During construction, there would be a requirement to temporarily close some PRoWs, with temporary diversions provided. These closures and diversions would be managed via a Public Rights of Way Management Plan (PRoWMP). An **outline Public Rights of Way Management Plan (oPRoWMP) [EN0110020/APP/5.14]** has been submitted with the Application.

5.6 Operation and Maintenance Phase

5.6.1 The Application is seeking consent for an operational period of 60 years for the Proposed Development, after which it would be decommissioned. During the Operation and maintenance phase, onsite activities are expected to be limited to landscape and ecological management, infrastructure maintenance, replacement of any failed equipment, and monitoring and inspection activities.

5.6.2 Due to general wear and tear, and expected lifespan of components of the Proposed Development, it is anticipated that some elements would need to be replaced during the Operation and maintenance phase. Technical assessments in this ES have been undertaken under the assumption of component lifespans set out in **Table 5.10**.

Table 5.10: Indicative lifespan of Components of the Proposed Development

Proposed Development Component	Expected Lifespan
Solar PV modules	25-40 years
Inverters	10-25 years
Solar mounting structures	Replacement not anticipated
Above ground, low-voltage cabling	25-30 years
Transformers	Replacement not anticipated
Monitoring and control systems	10-20 years
Batteries	5-15 years
Meteorological sensors	5-15 years

Substation equipment	Replacement not anticipated
Communication equipment	10-20 years

5.6.3 Estimates, type, and quantities of waste generated during the operation phase of the Proposed Development, including the replacement of the above components will be presented in **ES Volume 2, Chapter 16: Other Environmental Topics [EN0110020/APP/6.16]**. This also includes measures which control elements of expected maintenance works during the Operation Phase.

5.7 Decommissioning Phase

5.7.1 The Proposed Development would be operational for 60 years, after which time it would be decommissioned and returned to arable use, subject to the wishes of the landowner. Technical assessments of the potential impacts of decommissioning are presented in this ES.

5.7.2 Decommissioning is likely to involve the dismantling and recycling of the PV arrays with associated vehicle movements. Removal of BESS and substation foundations to 1.2m BGL would be completed subject to landowner agreement. Components of the Proposed Development such as mitigation planting, Site accesses, and ducts for cabling buried beneath plough-depth would be left in place subject to landowner agreement. These activities would be managed through a Decommissioning Environmental Management Plan (DEMP) and industry best practices and are not expected to result in any adverse environmental impacts.

5.7.3 Decommissioning is expected to take between 12 and 24 months and would be undertaken in phases. The effects of decommissioning are usually similar to, or of a lesser magnitude than, construction effects and will be considered in the relevant sections of the ES. The specific method of decommissioning the Proposed Development at the end of its operational life is uncertain at present as the engineering approaches to decommissioning will evolve over the operational life of the Proposed Development. Assumptions will therefore be made where appropriate.

5.7.4 An **outline Decommissioning Management Plan (oDEMP) [EN0110020/APP/5.11]** has been submitted as part of the Application and describes the framework of mitigation measures as identified in the ES to be followed and carried forward into a Decommissioning Environmental Management Plan (DEMP), which accords with the principles of the oDEMP, prior to decommissioning.

5.7.5 Approval for the DEMP will be sought from the relevant LPA before decommissioning begins, as stipulated by the requirement 16 of the **Draft DCO [EN0110020/APP/3.1]**. This plan will specify the procedures that the appointed contractor must follow and oversee throughout the decommissioning process. Contractors associated with the decommissioning of the Proposed Development would be required to incorporate environmental control, health and safety regulations, and current legislative and best practice guidance applicable at the time of decommissioning.

References

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